

Original Communication

Pattern of fatal head injuries due to vehicular accidents in Mangalore

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Received 10 July 2006; received in revised form 2 June 2007; accepted 4 June 2007

Available online 27 September 2007

Abstract

Head injury is an important cause of mortality worldwide as the head is the most vulnerable part of the body involved in fatal road traffic accidents. The present study was undertaken on 682 victims of road traffic accidents who died due to injuries sustained to the head, which were autopsied at District Wenlock Hospital, Mangalore over a period of 5 years between January 1999 and December 2003.

Most of the accidents had taken place during the afternoon and evening hours (1400–2200h). There was a marked male preponderance (84.6%). The most vulnerable age group was found to be between 21 and 30 years. Two wheeler occupants were most commonly involved.

Skull fractures were present in 88.88% of the cases. Fractures of the vault were found in 88%, base of the skull in 35.97% and a combination of both in 35% of cases. In most of the cases, fissured fractures were found (23%). Among intra-cranial haemorrhages, subdural haemorrhage was found in 52.63% and subarachnoid haemorrhage in 27.27% of cases. Contusions and lacerations of brain were found equally in 35% of cases.

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Keywords: Road traffic injury; Vehicular accident; Head injury

1. Introduction

The World Health Organisation defines an accident as an unexpected, unplanned occurrence that may involve injury.¹ During 1990s, road traffic accidents ranked ninth among the leading causes of death in the World. It was projected that if the same trend continued, it would become the second leading cause by the year 2020.² Each year road traffic injuries take the lives of 1.2 million people around the world.³ In 2002, the Global rate of deaths from road traffic injuries was about 19 per 100,000 people with adults aged between 15 and 44 years accounting for more than 50% of deaths.⁴

In developing countries, pedestrians were more frequently involved in road accidents than others, and two wheelers more commonly than other vehicles. In South-East Asian countries, 60–80% of road traffic injuries occurs in urban and semi-urban regions.⁵ In India, one accident occurs every 2 min with the accident rate corresponding to 45 per 100,000 population. In 1999, India had road traffic accidents at a rate of 7.5 accidents per 1000 vehicles with injuries and deaths correspond to 7.9 and 2.0 per 1000 vehicles, respectively.⁶

2. Materials and methods

The present study includes the retrospective analysis of 682 fatal head injury cases due to road traffic accident, which were autopsied at Kasturba Medical College, Mangalore over a period of 5 years from January 1997 to

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December 2003. Data were collected from police, relatives, hospital and post mortem records. The age and sex wise distribution, time of occurrence of accident, mean survival time of victims, profile of victims, type of vehicles involved and the pattern of cranio-cerebral trauma were studied.

3. Results and observations

3.1. Sex and age distribution

Males comprised 84.6% and females 15.4% of the total victims. The age groups of the victim were grouped into 10-year intervals ranging from 0 to 90 years. The youngest victim was a male child aged 1 year and the oldest was a 90 years-old male. The age distribution of study sample is shown in Table 1. Highest numbers of victims were found in the 21–30 years group (24.21%) and least in the 81–90 years group (0.7%).

3.2. Time of occurrence of accident

The time was divided into three periods of 8 h interval i.e. 10.00 p.m.–6.00 a.m., 6.00 a.m.–2.00 p.m. and 2.00 p.m.–10.00 p.m. Most of the accidents occurred during 2.00 p.m.–10 p.m. (45.3%) followed by 6.00 a.m.–2.00 p.m. (33.43%) and least during 10.00 p.m.–6.00 a.m. (21.26%).

3.3. Profile of victims

Most of the victims were of two wheelers 255 (37.4%) followed by pedestrians 251 (36.8%) and four wheelers 176 (25.8%) which is shown in Table 2. Occupants of light motor vehicles and heavy motor vehicles were almost equally involved, which corresponds to 29% and 28%, respectively.

Table 1
Age and sex wise distribution

Age range	Male	Female
0–10	24	14
11–20	58	12
21–30	148	17
31–40	109	26
41–50	102	9
51–60	69	16
61–70	40	10
71–80	22	1
81–90	5	–
Total	577	105

Table 2
Victims and offenders in vehicular accidents

Victim on	Number	Percentage
Pedestrians	251	36.8
Two wheelers	255	37.4
Four wheelers	176	25.8

Table 3
Period of survival

Survival period	Number of victims	%
Instantaneous/on the spot	428	62.75
0–6 h	8	1.17
6–24 h	110	16.12
1–3 days	77	11.29
3–7 days	27	3.95
7–45 days	31	4.54
45–75 days	1	0.14

3.4. Duration of survival and surgical intervention

Of the total cases, 62.75% of victims died on the spot, while 26% of the victims were treated surgically. Burr holes were observed in 22% of cases with craniotomy done in 4%. Dura was sutured in 8% and lobectomy was done in 6% of cases. The mean survival period of victims was 6–24 h (16.12%) as shown in Table 3.

3.5. Pattern of cranio-cerebral trauma

External injury to the face and scalp were found in 82% of the victims. In 88.88% of cases, fractures of skull were found. Fissured fracture was the most commonly observed fracture (23.1%).followed by depressed fractures in 21.28%. The least seen was sutural fractures (14.6%). Cranial vault was involved in 88.88%, base of skull in 35.97%, and both vault and base in 35% of cases. Anterior cranial fossa, parietal bone and temporal bone were the most commonly involved areas in fracture, which corresponds to 36.23%, 34.48% and 34.46%, respectively. Least involved area was the occipital bone (23.1%).

Contusions and lacerations of brain were found in equal number of cases (35%). Table 5 explains the type of intracranial haemorrhages seen. Subdural haemorrhage (52.63%) was observed most commonly, followed by sub-arachnoid haemorrhage (27.27%). Whereas extradural haemorrhages were found in comparatively less number of cases viz., 17.15%. Combinations of all haemorrhages were seen only in 5% of cases.

Table 4
Distribution of type of the fractures of the skull

Type of fracture	Pedestrian	Two wheeler	Four wheeler
Sutural	25	39	25
Fissured	39	51	50
Depressed	37	52	38
Comminuted	33	38	26

Table 5
Types of intracranial haemorrhages

Intra-cranial injury	Pedestrian	Two wheeler	Four wheeler
Extradural haemorrhage	52	37	28
Subdural haemorrhage	108	146	105
Subarachnoid haemorrhage	58	75	53

4. Discussion

Current trends in population growth, industrialization and urbanization are putting heavy pressure on transport networks, particularly on the road systems in the developing world. Because of this, deaths due to road traffic accidents are steadily increasing in the developing countries.⁷

In the present study, males are more commonly involved in accidents with the male to female ratio being 8.3:1. This is in concurrence with other studies.^{8–12} This shows the male dominance in the moving population especially on the roads and in vehicles.

In our study, the age group of 21–30 years was the most common and those above 80 years was the least common age group involved in accidents. This corresponds with other studies.^{8–12} The young and middle-aged groups largely consist of students and working people in various jobs, who usually travel by own vehicles, use the public transportation or walk. This results in the involvement of young adults more commonly in road traffic accidents.

Two wheeler occupants were most commonly involved followed by pedestrians. In some studies, pedestrians were more involved than vehicular occupants.^{8,9,11} Whereas, few studies showed more involvement of vehicular occupants than pedestrians.^{10,12} This shows the erratic pedestrian behavior and reckless driving of vehicles on the roads. Majority of the occupants belonged to two wheelers in our study, which is consistent with other studies.^{9,11,12} This may be explained by the fact that two wheelers being cheaper than cars are affordable for a larger number of people. The increasing numbers of two wheelers on the roads without strict enforcement of safety helmet wear among the occupants are probably one of the main reasons for increased two wheeler accidents. Safety helmets were not compulsory in Mangalore during the study period. According to the police history, none of the victims autopsied were wearing safety helmets during the time of the accidents. This is ample evidence of the protective role of safety helmets. Overcrowding of passengers in vehicles is another feature of Indian roads. Accordingly, when such a vehicle is involved in an accident, the toll is usually higher. Drunken driving is a known factor which increases the risk of causing accidents.

Most of the accidents in our study had occurred between afternoon and evening hours (2.00 p.m.–10.00 p.m.) followed by night and early morning (10.00 p.m.–6.00 a.m.), which is in concurrence with study of Nilamber et al.¹² Whereas, findings of some studies have showed that accidents were more between 18.00 and 24.00 h followed by 12.00–18.00 h.^{8,11} This indicates that accidents are common in the afternoon and evening hours. Traffic during these hours are usually at their peak, and taking into account the increased pedestrian traffic, associated with improper infrastructure facilities like absence of sidewalks usually compound to the problem.

In the present study, head injury was present in 82% cases. This is comparable to studies done by Akang

et al.¹⁰ (83.8%) and Chandra et al.⁹ (72%). Whereas, studies of Gautam et al.¹¹ and Patel⁸ found it in 56.4% and 47%, respectively. From the above facts, it is clear that the head is the most vulnerable part of the body involved in road traffic accidents, which alone accounts for most of the fatalities.

Skull fractures involving the vault were found in 88.88% of cases and 35.97% involved the base. In studies done by Chandra et al.⁹ and Akang et al.¹⁰ skull fractures were found in 79.87% and 38.2%, respectively. This shows that fatalities are more common in head injuries associated with skull fractures than those without fractures.

In the present study, the most common type of intracranial haemorrhage found was subdural haemorrhage (52.63%), which is consistent with the study of Akang et al.¹⁰ (62.4%). This is followed by subarachnoid haemorrhage, which was found in 27.27% cases of our study and 24.6% in Akang et al.¹⁰ study. Whereas, study done by Chandra et al.⁹ showed subarachnoid haemorrhage as most common type (66.9%), followed by subdural haemorrhage (58.2%). Extradural, intra-cerebral and intra-ventricular haemorrhages were found in significantly less number of our cases, which is in concurrence with other studies.^{9,10} Contusions and lacerations of brain were found equally in our study (35%), which is consistent with study of Chandra et al.⁹ (24%). Therefore, it is difficult to predict the type and extent of injury, which would be compatible with life.

Road traffic policies such as pedestrian-friendly paths, separate lanes for light motor vehicles and heavy motor vehicles, and strict implementation of traffic rules and regulations may decrease the incidence of road traffic accidents and its fatalities.

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